Stat 350: Lab 6

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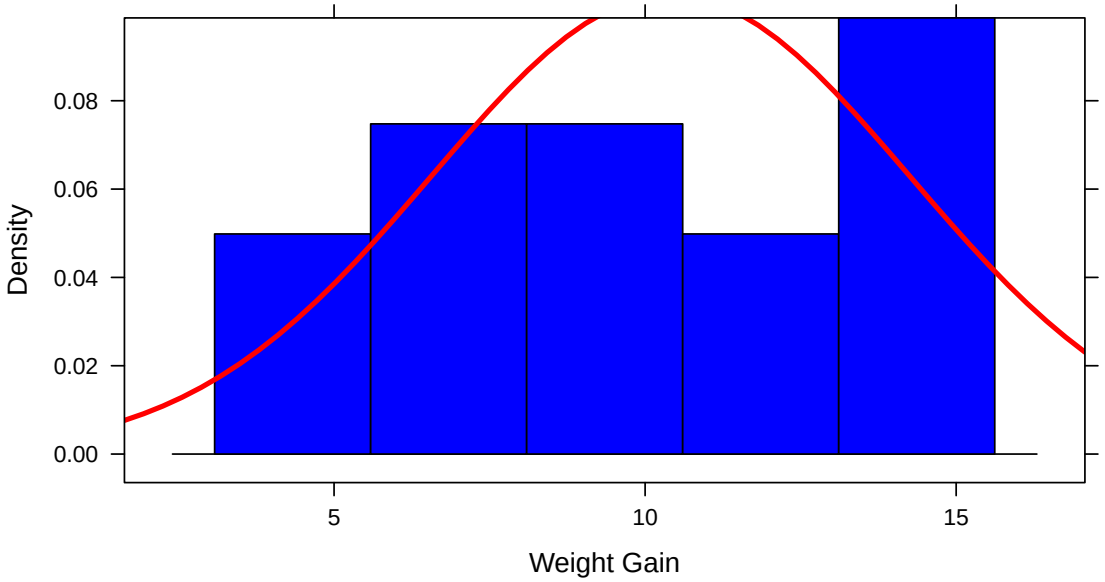
A. Food Intake and Weight Gain

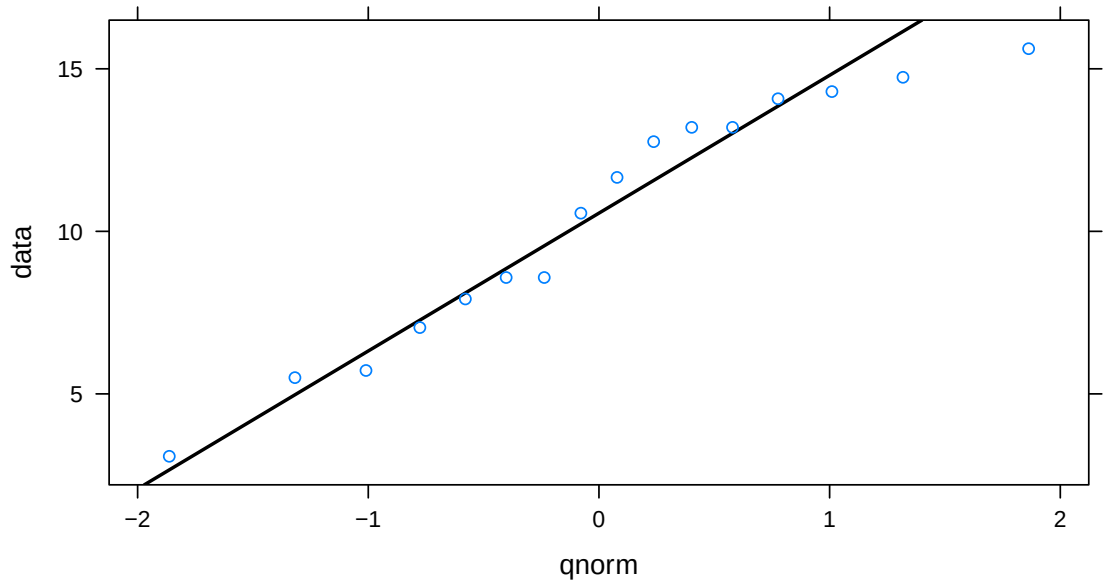
1. Two Sample or Matched Pairs

A matched pair t test is more approprate because the experiment is structured so that a measure is taken multiple times on the same subject.

2. Proving Data is Normal

Due to the small size of the data set, the histogram doesn't follow the normal curve to the T (heh), but the quantile plot exhibits the linear characteristic of a normal distribution, proving that the data is roughly normal.





3. 95% Confidence of Weight Gain

The 95% confidence interval spans from 8.3622181 to 12.4552819, which is reasonable given that the mean of the differences between the paired data sets is 10.40875.

4. Testing $H_0 = 16$

1. $H_0 : \mu = 16$
   $H_a : \mu \neq 16$
   $\alpha = 0.05$
2. $t_t = -5.8232503$
   $DF = 15$
3. P-Value $= 3.3547947 \times 10^{-5}$
4. P-Value $\leq \alpha$ $(3.3547947 \times 10^{-5} \leq 0.05)$
   $\implies H_0$ is rejected

5. Interpretation

Step 3 identifies with 95% confidence that the mean of the data set is located between 8.3622181 and 12.4552819. In Step 5 the hypothesis of $H_0\mu = 16$ is rejected. Seeing as 16 is outside the defined confidence interval, these two conclusions are in agreement. As also identified in Step 3, it would be prudent to search for μ somewhere around the mean of differences of 10.40875.

Code

```
library(lattice)
library(xtable)
my_qqwithline <- function(data, title = NULL) {
    qqmath(data, panel = function(x) {
        panel.qqmathline(x, distribution = qnorm, lwd = 2)
        panel.qqmath(x)
    }, main = title)
}
my_histogram <- function(x, avg, std, ...) {
    histogram(x, panel = function(x) {
        panel.histogram(x, breaks = NULL, ...)
        panel.mathdensity(dmath = dnorm, col = "red", args = list(mean = avg,
            sd = std), lwd = 3)
    }, type = "density", ...)
}
weight <- read.table("ex07-36wtgain.txt", header = TRUE)
# convert to pounds
weight$wta <- weight$wta * 2.2
weight$wtb <- weight$wtb * 2.2
my_data <- weight$wta - weight$wtb
my_histogram(my_data, mean(my_data), sd(my_data), col = "Blue", xlab = "Weight Gain")
my_qqwithline(my_data)
conf <- t.test(weight$wta, weight$wtb, paired = TRUE, mu = 16)
```